

**Notice of Allowability**

Application No.

10/028,518

Applicant(s)

CHAPPA ET AL.

Examiner

Hai Vo

Art Unit

1771

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the terminal disclaimers filed 03/30/2007.
2. ☒ The allowed claim(s) is/are 22,29,30,36,43,46 and 55.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some\* c) ☐ None of the:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

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|--|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 5. <input type="checkbox"/> Notice of Informal Patent Application  |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date <u>20070331</u> . |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date _____    | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment  |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance                         |
|  | 9. <input type="checkbox"/> Other _____  |

***Terminal Disclaimer***

The terminal disclaimers filed on 03/30/2007 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration dates of US 6,669,994; US 6,706,408 and US 7,087,658 have been reviewed and is accepted. The terminal disclaimers have been recorded.

***Examiner's Amendment***

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Matt Graham on 03/30/2007.

The application has been amended as follows:

***The claims:***

22. (Currently Amended) A porous support surface bearing a polymeric coating prepared according to a method comprising the steps of:

- a) providing a porous support surface;
- b) providing a nonpolymeric grafting reagent comprising at least two photoinitiator groups, the grafting reagent having one or more substituents comprising positively charged groups;
- c) providing at least one polymerizable monomer solution to be contacted with the surface, in the presence of the grafting reagent, and to be polymerized upon activation of the photoinitiator; and

d) applying the grafting reagent and monomer solution to the surface to coat the surface with the grafting reagent and to cause the polymerization of monomers to the surface upon activation of the grafting reagent, wherein the polymeric coating is covalently attached to the surface by the residues of one or more photoinitiator groups provided by the grafting reagent and the polymeric coating is less than about 100 nanometers in thickness ~~and a desired porosity of the porous support surface is preserved after the polymerization of the monomers.~~

29. (Currently Amended) A porous support surface bearing a polymeric coating prepared according to a method of forming a polymeric coating on a support surface, the method comprising:

- a) providing a porous support surface;
- b) providing a nonpolymeric grafting reagent comprising at least two photoinitiator groups, at least one of which to be activated in order to covalently attach the grafting reagent to the surface itself, and further comprising one or more ~~constituents~~ substituents comprising positively charged groups;
- c) providing at least one polymerizable monomer solution to be contacted with the surface, in the presence of the grafting reagent, and to be polymerized upon activation of the grafting reagent; and
- d) applying the grafting reagent and monomer solution to the surface to coat the surface with the grafting reagent and to cause the polymerization of monomers to the surface upon activation of the grafting reagent and the covalent attachment of the reagent to the surface, wherein the polymeric coating is less than about 100 nanometers in

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~~thickness wherein a desired porosity of the porous support surface is preserved after the polymerization of the monomers.~~

36. (Currently Amended) A device comprising a surface bearing a polymer coating formed according a method comprising the steps of:

- a) providing a support surface;
- b) providing a nonpolymeric grafting reagent comprising at least two photoinitiator groups, the grafting reagent having one or more substituents comprising positively charged groups;
- c) providing at least one polymerizable monomer solution to be contacted with the surface, in the presence of the grafting reagent, and to be polymerized upon activation of the photoinitiator; and
- d) applying the grafting reagent and monomer solution to the surface to coat the surface with the grafting reagent and to cause the polymerization of monomers to the surface upon activation of the grafting reagent, wherein the support surface comprises a porous support surface and the polymer coating is covalently attached to the surface by the residues of one or more latent reactive groups provided by the grafting reagent and ~~the polymer coating is less than about 100 nanometers in thickness and a desired porosity of the porous support surface is preserved after the polymerization of the monomers.~~

42. (Currently Amended) A device comprising a surface bearing a polymer coating, the polymer coating being formed by a method comprising the steps of:

- a) providing a porous support surface;
- b) providing a nonpolymeric grafting reagent comprising at least two photoinitiator groups, at least one of which is to be activated in order to covalently attach

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the grafting reagent to the surface itself, and further comprising one or more ~~constituents~~ substituents comprising positively charged groups;

c) providing at least one polymerizable monomer solution to be contacted with the surface, in the presence of the grafting reagent, and to be polymerized upon activation of the grafting reagent; and

d) applying the grafting reagent and monomer solution to the surface to coat the surface with the grafting reagent and to cause the polymerization of monomers to the surface upon activation of the grafting reagent and the covalent attachment of the reagent to the surface, wherein the polymer coating is less than about 100 nanometers in thickness ~~wherein a desired porosity of the porous support surface is preserved after the polymerization of the monomers~~, and further wherein the support surface comprises a material selected from the group consisting of polyolefins, polystyrenes, poly(alkyl)methacrylates and poly(alkyl) acrylates, polyacrylonitriles, poly(vinylacetates), poly(vinyl alcohols), chlorine-containing polymers such as poly(vinyl) chloride, polyoxymethylenes, polycarbonates, polyamides, polyimides, polyurethanes, polyvinylidene difluoride (PVDF), phenolics, amino-epoxy resins, polyesters, silicones, polyethylene terephthalates (PET), polyglycolic acids (PGA), poly-(p-phenyleneterephthalamides), polyphosphazenes, polypropylenes, parylenes, silanes, and silicone elastomers, as well as copolymers and combinations thereof, and

the grafting reagent is selected from:

ethylenebis(4-benzoylbenzyltrimethylammonium) dibromide (Diphot-Diquat);  
hexamethylenebis(4-benzoylbenzyltrimethylammonium) dibromide (Diphot-Diquat);

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1,4-bis(4-benzoylbenzyl)-1,4-dimethylpiperazinediium dibromide (Diphoto-Diquat); bis(4-benzoylbenzyl)hexamethylenetetraminediium dibromide (Diphoto-Diquat); bis[2-(4-benzoylbenzyl)dimethylammonio)ethyl]-4-benzoylbenzylmethylammonium tribromide (Triphoto-Triquat); 4,4-bis(4-benzoylbenzyl)morpholinium bromide (Diphoto-Monoquat); ethylenebis[(2-(4-benzoylbenzyl)dimethylammonio)ethyl]-4-benzoylbenzylmethylammonium] tetrabromide (Tetraphoto-Tetraquat); and 1,1,4,4-tetrakis(4-benzoylbenzyl)piperazinediium Dibromide (Tetraphoto-Diquat), and analogues thereof, and

wherein the polymer is formed by the polymerization of polymerizable monomers selected from:

a) neutral hydrophilic structural monomers selected from acrylamide, methacrylamide, N-alkylacrylamides, N-vinylpyrrolidinone, N-vinylacetamide, N-vinyl formamide, hydroxyethylacrylate, hydroxyethylmethacrylate, hydroxypropyl acrylate or methacrylate, glycerolmonomethacrylate, and glycerolmonoacrylate;

b) negatively charged hydrophilic functional monomers selected from acrylic acid, methacrylic acid, maleic acid, fumaric acid, itaconic acid, AMPS (acrylamidomethylpropane sulfonic acid), vinyl phosphoric acid, vinylbenzoic acid; and

c) positively charged monomers selected from 3-aminopropylmethacrylamide (APMA), methacrylamidopropyltrimethylammonium chloride (MAPTAC), N,N-dimethylaminoethylmethacrylate, N,N-diethylaminoethylacrylate,

and combinations thereof.

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43. (Currently Amended) A device comprising a surface bearing a polymer coating formed according a method comprising the steps of:

- a) providing a support surface;
- b) providing a nonpolymeric grafting reagent comprising at least two photoinitiator groups, the grafting reagent having one or more substituents comprising positively charged groups;
- c) providing at least one polymerizable monomer solution to be contacted with the surface, in the presence of the grafting reagent, and to be polymerized upon activation of the photoinitiator; and
- d) applying the grafting reagent and monomer solution to the surface to coat the surface with the grafting reagent and to cause the polymerization of monomers to the surface upon activation of the grafting reagent, wherein the support surface comprises a porous support surface and the polymer coating is covalently attached to the surface and the polymer coating is less than about 100 nanometers in thickness ~~and a desired porosity of the porous support surface is preserved after the polymerization of the monomers.~~

46. (Currently Amended) A support surface bearing a polymeric coating prepared according to a method comprising the steps of:

- a) providing a support surface;
- b) providing a nonpolymeric grafting reagent comprising four photoinitiator groups, the grafting reagent having a nonpolymeric core molecule with the four photoinitiator groups attached to the core molecule;

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c) providing at least one polymerizable monomer to be contacted with the surface, in the presence of the grafting reagent, and to be polymerized upon activation of at least one of the photoinitiator groups; and

d) applying the grafting reagent and monomer solution to the surface to coat the surface with the grafting reagent and to cause the polymerization of monomers to the surface upon activation of the grafting reagent, wherein the support surface comprises a porous support surface and the polymeric coating is less than about 100 nanometers in thickness ~~and a desired porosity of the porous support surface is preserved after the polymerization of the monomers~~, and the polymeric coating is covalently attached to the surface.

55. (Currently Amended) A porous surface according to claim ~~46~~ 54 wherein the support surface comprises a material selected from the group consisting of polyolefins, polystyrenes, poly(alkyl)methacrylates and poly(alkyl) acrylates, polyacrylonitriles, poly(vinylacetates), poly(vinyl alcohols), chlorine-containing polymers such as poly(vinyl) chloride, polyoxymethylenes, polycarbonates, polyamides, polyimides, polyurethanes, polyvinylidene difluoride (PVDF), phenolics, amino-epoxy resins, polyesters, silicones, polyethylene terephthalates (PET), polyglycolic acids (PGA), poly-(p-phenyleneterephthalamides), polyphosphazenes, polypropylenes, parylenes, silanes, and silicone elastomers, as well as copolymers and combinations thereof, and

the grafting reagent is selected from:

tetrakis (4-benzoylbenzyl ether), the tetrakis (4-benzoylbenzoate ester) of pentaerythritol, and an acylated derivative of tetraphenylmethane, and



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wherein the polymer is formed by the polymerization of polymerizable monomers selected from:

- a) neutral hydrophilic structural monomers selected from acrylamide, methacrylamide, N-alkylacrylamides, N-vinylpyrrolidinone, N-vinylacetamide, N-vinylformamide, hydroxyethylacrylate, hydroxyethylmethacrylate, hydroxypropyl acrylate or methacrylate, glycerolmonomethacrylate, and glycerolmonoacrylate;
- b) negatively charged hydrophilic functional monomers selected from acrylic acid, methacrylic acid, maleic acid, fumaric acid, itaconic acid, AMPS (acrylamidomethylpropane sulfonic acid), vinyl phosphoric acid, vinylbenzoic acid;
- c) positively charged monomers selected from 3-aminopropylmethacrylamide (APMA), methacrylamidopropyltrimethylammonium chloride (MAPTAC), N,N-dimethylaminoethylmethacrylate, N,N-diethylaminoethylacrylate; and
- d) macromeric polymerizable molecule selected from poly(ethylene glycol)monomethacrylate, methoxypoly(ethylene glycol)monomethacrylate, poly(ethylene glycol)monoacrylate, methacrylamidopoly(acrylamide), poly(acrylamide-co-3-methacrylamidopropylacrylamide), poly(vinylalcohol)methacrylate, poly(vinylalcohol)acrylate, poly(vinylalcohol)dimethacrylate, and combinations thereof.

**Cancel** claims 1-21, 23-28, 31-35, 37-41, 44, 45 and 47-54.

### ***Reasons for Allowance***

The following is an examiner's statement of reasons for allowance: Note that Applicant's declaration and Examiner's amendment are sufficient to

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overcome the art rejections and sufficient to place the instant claims in condition for allowance.

Of the references of record, the most pertinent are Swan (US 6,603,040), Swan et al (US 5,414,075), Swan et al (US 6,077,698), WO 2001/21326, Swan et al (US 6,669,994) and Swan et al (US 7,087,658) and Jelle (US 6,706,408).

Swan '040 discloses a surface coating agent comprising the same grafting agent disclosed by the present invention. Swan '040 does not disclose a polymeric coating covalently attached to a porous support surface upon activation of the grafting agent wherein the polymeric coating has a thickness of less than 100 nm.

In the declaration filed on 01/19/2007, an experiment was conducted to show that the polymeric coatings obtained by grafting as claimed in the present invention are structurally different than those obtained by immobilization as described by Swan '075. The coating of Swan '075 has a thickness ranging from 994 nm to 1056 nm, which is at least 10 times thicker than the coating of the claimed invention. Swan '698, like Swan '075, discloses the immobilization of a pre-formed polymer coating. Swan '698 is directed to the products formed by immobilizing pre-formed polymers on a reagent attached to a surface. Swan '698 uses the same materials and the same approach to form a polymeric coating on a support surface as Swan '075 (column 5, lines 45-65, example 2). Therefore, it is the examiner's position that the polymeric coating of Swan '698 would have the same thickness as the Swan '075 polymer coating. Accordingly, the showing is sufficient to exclude Swan '075 and Swan '698 as prior art.

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WO 2001/21326 is an equivalent form of US 6,669,994 and US 7,087,658. WO'326 has common inventors with the instant application. Therefore, WO'326 is by Applicants, i.e., not by another and thus is not available as prior art under any paragraph of 102.

The obviousness-type double patenting rejections over US 6,669,994, US 6,706,408 and US 7,087,658 separately have been overcome in view of the terminal disclaimers filed 03/30/2007.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai Vo whose telephone number is (571) 272-1485. The examiner can normally be reached on Monday through Thursday, from 9:00 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on (571) 272-1478. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HV

**HAIVO  
PRIMARY EXAMINER**